Solid State Laser

Developing Technology for a Tactical Laser Weapon

U.S. Army Space and Missile Defense Command
Space and Missile Defense Technical Center

The Solid State Laser (SSL) program is geared to develop and integrate the diode-pumped laser technology necessary to produce a compact SSL weapons-level device. This device will ultimately be capable of protecting the Objective Force against threats such as Anti-Tank Guided Missiles (ATGM's), Unmanned Airborne Vehicles, rockets, artillery, and mortars.

The SSL program directly supports the U.S. Army Air Defense Artillery School's Enhanced Area Air Defense of the Joint Theater Air and Missile Defense Mission Needs Statement, dated July 07, 1999. This mission requires laser power levels in the few hundreds of kW's. In addition, the SSL has the potential of enhancing the Future Combat System's survivability by defeating Precision Guided Munitions such as ATGMs. This mission directly supports the FCS Operational Requirements Document (ORD).

The SSL development focuses on designing and fabricating a proof-of-principal SSL weapons-level device. The SSL will ultimately be integrated at the High Energy Laser System Test Facility at White Sands Missile Range, N.M., where it will be tested against dynamic threats.

Because the SSL's operational characteristics require it to be compact, lightweight, all-electric and to have excellent atmospheric propagation, the SSL weapon can be demonstrated on highly mobile, lightweight platforms such as the Hybrid Electric High Mobility Multi-purpose Wheeled Vehicle (HE-HMMWV). The recently developed HE-HMMWV (XM1124) offers not only an effective platform, but its diesel-fueled motor/electric generator combination provides a cost-effective power source for a near-term SSL vehicle demonstrator.

Initially in the SSL program, a baseline heat capacity SSL system was defined, laser technology risks were identified, and risk reduction experiments were performed. As a part of this risk reduction, a flashlamp pumped single prototype module was designed and built to evaluate illumination uniformity, edge cladding, and wavefront correction subsystems and techniques.

The program has completed a demonstration of intermediate scale hardware. In this demonstration, the single module design was upgraded and replicated to produce a subscale prototype system consisting of multiple flashlamp pumped modules capable of lasing at over 10 kW average power. The next major step involves taking the subscale system device and upgrading it to weapons level by replacing the flashlamp-pumping source with a laser emitting diode-pumping source.

This process has been demonstrated on a single disk and on a single module. The single module currently outputs over 11 kW average power. This module will soon be upgraded with another disk to first produce 15 kW and then with larger disks to produce over 20 kW. The final part of the process is to replace the flashlamps with diodes on a multi-module device to increase the power and repetition rate by an order of magnitude.

For more information, please contact:

U.S. Army Space and Missile Defense Command
Public Affairs Office
P.O. Box 1500
Huntsville, AL 35807-3801
Phone: 256-955-3887
Fax: 256-955-1214
Email: webmaster@smdc.army.mil
Website: www.smdc.army.mil